

REMARKS

Applicants' Agent greatly appreciates the Examiner's helpful remarks during the telephone conversation on March 12, 2002.

In the Advisory Action, mailed March 4, 2002, the Examiner states that "while the specification does indicate at page 3 that 'The method described herein does not require PCR,' the specification does not recite or otherwise disclose a 'non-PCR amplified nucleic acid-containing sample.'"

Respectfully, Applicants disagree. The Examiner has not presented "a preponderance of evidence why a person skilled in the art would not recognize in an applicant's disclosure a description of the invention defined by the claims" (M.P.E.P. 2163.04). Notwithstanding, the specification discloses on page 3, lines 21-23, that

"The method described herein does not require PCR and does not require *a priori* knowledge of the sequence of the nucleic acid molecule to be assessed."

Thus, Applicants' specification discloses that, in addition to not requiring PCR, the method does not require any knowledge of the nucleotide sequence of the sample. Since Applicants clearly intended to encompass nucleic acid samples for which there was not *a priori* knowledge of the nucleotide sequence, a sample obtained without the use of PCR (i.e., a non-PCR amplified sample) is clearly encompassed within Applicants' description of the invention. Applicants respectfully submit that one skilled in the art would recognize the above passage from Applicants' specification to describe a non-PCR amplified sample.

Therefore, the claims as amended and the newly added claims filed herewith clearly define an embodiment of the disclosed invention and do not incorporate new matter.

Claim Amendments

Claims 1, 12, 14, 24, 28, 31, 42, 44, 46, 47, 48, and 49 have been amended to more clearly define the invention. Additionally, the above claims have been amended to recite "obtaining a **non-PCR amplified** nucleic acid-containing sample" (emphasis added). Support for the claim amendments can be found throughout the Specification, for example, page 3, lines 21-24; page 3, lines 8-13; page 15, lines 11-25; page 26, line 14 through page 27, line 27; and page 19, line 22 through page 28, line 9. No new matter has been added by these amendments.

Claims 43 and 45 have been canceled. Claims 42 and 44 have been amended to include the recitations of Claims 43 and 45.

New Claims

New Claims 91-131 have been added. Claims 91-131 comprise previously filed Claims 1-49 further including the recitations of Claim 42. No new matter has been added by the new claims.

Rejections of Claims under 35 U.S.C. §112, Second Paragraph

Claims 1-25, 27-36, 38, 40, and 42-49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, for the reasons stated below and in the Office action of paper no. 4.

A. The Examiner states that "Claims 1-25, 27 and 42-49 are indefinite over the recitation of the terms 'identifying' and 'identify' in claims 1, 14, 42, 44, and 46-48" (Office Action, page 2). The Examiner further states that "the portion of the specification cited by applicant does not clarify whether the recitation of 'identifying'/'identify' would in fact require any type of active step, or whether steps of 'identifying' might encompass, e.g., thought processes" (Office Action, page 3).

Respectfully, Applicants disagree. However, solely to advance prosecution, Claims 1, 14, 42, 44 and 46-48 have been amended to recite the active steps of "detecting" and/or "detect."

B. The Examiner states that "Claims 1-25, 27-36, 38, 40, 42-45 and 48-49 are indefinite over the recitation of the terms 'analyzing' and 'analyzed' in claims 1, 14, 28, 42, 44, and 48" (Office Action, page 3). The Examiner states that "the portion of the specification cited by applicant does not clarify whether the recitation of 'analyzing' and 'analyzed' would in fact require any type of active step, or whether steps of 'analyzing' might encompass, e.g., thought processes" (Office Action, page 4).

Respectfully, Applicants disagree. However, solely to advance prosecution, Claims 1, 14, 28, 42, 44 and 48 have been amended to delete "analyzing" and "analyzed" and include active steps.

C. The Examiner states that "Claims are indefinite over the recitation of the terms 'selected' and 'selecting' in claims 1, 12, 14, 24, 28, 31, and 46-48" (Office Action, page 4). The Examiner states that "the portion of the specification cited by applicant does not clarify whether the recitation of 'selected' and 'selecting' would in fact require any type of active step, or whether steps of 'selecting' might encompass, e.g., thought processes" (Office Action, page 5).

Respectfully, Applicants disagree. However, solely to advance prosecution, Claims 1, 12, 14, 24, 28, 31, and 46-48 have been amended to recite the active steps of "isolating" and/or "isolated."

D. The Examiner states that "Claims 42-45 are indefinite over the recitation of the limitation 'proposed pairs' in claims 42 and 44". The Examiner states that "it is unclear as to what types of pairs might be considered to be 'proposed' pairs, and as to how such pairs relate back to the 'pairs of fragments' of claims 1 and 14" (Office Action, page 5).

Respectfully, Applicants disagree. However, solely to advance prosecution, Claims 42 and 44 have been amended to delete "proposed."

E. The Examiner states that "Claims 42-45 are indefinite over the recitation of the term 'candidate single nucleotide polymorphisms' in claims 42 and 44". The Examiner states that "[i]t remains unclear as to how a 'candidate single nucleotide polymorphism' would differ from a

'single nucleotide polymorphism' within the context of the claimed invention" (Office Action, page 6).

Respectfully, Applicants disagree. However, solely to advance prosecution, Claims 42 and 44 have been amended to delete "candidate."

F. The Examiner states that "Claims 42-45 are indefinite over the recitation of the phrase 'determining the number of candidate matches for the same chromosomal location, wherein said candidate matches are accepted if said number of matches does not exceed expectations'" (Office Action, page 6). The Examiner states that "[w]hile the portion of the specification referenced by the applicant provides an example of how putative orthologues may be analyzed to determine whether a 'candidate match' would constitute a 'match', no particular limitations or definitions are provided that would provide a clear limitation of the recitation in the present claims of the language 'if said number of matches does not exceed expectations'" (Office Action, page 7).

Applicants have amended Claims 42 and 44 to include the recitations of Claims 43 and 45. Specifically, Claims 42(e) and 44(e) recite "determining the number of single nucleotide polymorphism matches for the same chromosomal location, wherein said matches are accepted if said number of matches does not exceed the theoretical expectations of a binomial or Poisson distribution, wherein accepted matches are considered a pair."

G. The Examiner states that "Claims 43 and 45 are indefinite over the recitation of the phrase 'wherein said expectations are determined according to binomial or Poisson distribution'" (Office Action, page 7). The Examiner states that "the present rejection was made because applicants' claim language does not make clear how one is to employ 'binomial or Poisson distributions' to determine expectations" (Office Action, page 7).

Claims 43 and 45 have been canceled. Claims 42 and 44 have been amended to recite "wherein said matches are accepted if said number of matches does not exceed the theoretical expectations of a binomial or Poisson distribution." Thus, Applicants have clearly stated how one of skill is to employ binomial and Poisson distributions. Furthermore, Applicants disclose how to calculate and use the statistical expectations to select a pair (Examples 1-3), and the skilled artisan is well-versed in the use of such statistical tools.

All claims, particularly as amended, are in condition for allowance. Respectfully, Applicants request the rejection be withdrawn.

Rejection of Claims 1-4, 8-10, 12-17, 21-22, 24-25, 27-29, 31-32 and 46-49 under 35 U.S.C. §102(b)

Claims 1-4, 8-10, 12-17, 21-22, 24-25, 27-29, 31-32 and 46-49 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Gu *et al.* (*BioTechniques* 24(5):836-837 [5/1998]), for the reasons stated in the Office Action of paper no. 4. The Examiner states that “[t]he step of obtaining amplification products taught by Gu *et al.* constitutes a step of obtaining a ‘nucleic acid-containing sample’ that is encompassed by the present claims” (Office Action, page 9).

Applicants note that Claims 1, 14, 28, 46, 47 and 48 have been amended to recite “obtaining a **non-PCR amplified** nucleic acid-containing sample” (emphasis added). As described in the Amendment filed March 13, 2001, Gu *et al.* do not teach obtaining a non-PCR amplified nucleic acid-containing sample. Therefore, Gu *et al.* do not teach every element of the claimed invention, particularly as amended, as required under 35 U.S.C. 102. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejection of Claims 6-7, 19-20, 36, 38, and 40 under 35 U.S.C. §103(a)

Claims 6-7, 19-20, 36, 38, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gu *et al.* (*BioTechniques* 24(5):836-837 [5/1998]) in view of Landegren *et al.* (*Genome Res.* 8(8):769-776 [8/1998]), for reasons stated in the Office Action of paper no. 4 (Office Action, page 9). The Examiner states that “the claims encompass ‘obtaining’ in any manner any type of ‘nucleic acid-containing sample’” and that “[a]ccordingly, methods in which ‘obtaining’ is achieved by steps including amplification are encompassed by the present claims” (Office Action, pages 10-11).

Applicants note that Claims 1, 14, 28, 46, 47 and 48 have been amended to recite “obtaining a **non-PCR amplified** nucleic acid-containing sample” (emphasis added). As described above, Gu *et al.* does not anticipate or render obvious Claims 1-4, 8-10, 12-17, 21-22, 24-25, 27-29, 31-32 and 46-49, particularly as amended. Since Claims 6-7, 19-20, 36, 38 and 40

incorporate all of the limitations of the claims from which they depend, *Gu et al.* also does not anticipate or render obvious Claims 6-7, 19-20, 36, 38 and 40.

Moreover, the addition of Landegren *et al.* does not remedy the defects of *Gu et al.* As stated in the Amendment filed March 13, 2001, Landegren *et al.* teach that all SNP-related methods require PCR amplification of known target sequences. Thus, the teachings of Landegren *et al.* further support the disclosure of *Gu et al.*, i.e., that PCR amplification is a necessary component of SNP discovery methods prior to the subject invention. Therefore, neither Landegren *et al.* nor *Gu et al.*, either alone or in combination, teach or suggest obtaining a **non-PCR amplified** nucleic acid-containing sample. Thus, Landegren *et al.* and *Gu et al.* do not provide the teaching or suggestion to make the claimed combination, do not provide the reasonable expectation of success if one of ordinary skill were to do so, and do not teach or suggest all claim limitations of Applicants' invention, as required under 35 U.S.C. §103. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejection of Claims 5 and 18 under 35 U.S.C. §103(a)

Claims 5 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Gu et al.* in view of *Wu et al.* (*DNA* 8(2):135-142 [1989]), for the reasons stated in the Office Action of paper no. 4. The Examiner states that "the present claims do not exclude the use of nucleic acids of known sequence, and the claims encompass 'obtaining' in any manner any type of 'nucleic acid-containing sample'" and that "[a]ccordingly, methods in which 'obtaining' is achieved by steps including amplification using 'specific PCR primers' are encompassed by the present claims" (Office Action, page 12).

Applicants note that Claims 1, 14, 28, 46, 47 and 48 have been amended to recite "obtaining a **non-PCR amplified** nucleic acid-containing sample" (emphasis added). As described above, *Gu et al.* does not anticipate or render obvious Claims 1-4, 8-10, 12-17, 21-22, 24-25, 27-29, 31-32 and 46-49, particularly as amended. Since Claims 5 and 18 incorporate all of the limitations of the claims from which they depend, *Gu et al.* also does not anticipate or render obvious Claims 5 and 18.

The addition of *Wu et al.* does not remedy the defects of *Gu et al.* As stated in the Amendment filed March 13, 2001, *Wu et al.* does not teach a method for identifying new

polymorphisms by analysis of RNA, but rather teach the use of a known polymorphism-specific probe on a spot of total RNA isolated from an individual to determine its presence or absence. Therefore, neither Gu *et al.* nor Wu *et al.*, either alone or in combination, teach or suggest a method for detecting a collection of polymorphisms by analysis of RNA comprising obtaining a non-PCR amplified nucleic acid-containing sample. Thus, Gu *et al.* and Wu *et al.* do not provide the teaching or suggestion to make the claimed combination, and do not provide a reasonable expectation of success if one of ordinary skill were to do so, as required under 35 U.S.C. §103. Furthermore, even if one of ordinary skill were to use RNA in the methods of Gu *et al.*, the combination would still not teach or suggest all claim limitations of Applicants' invention, as required under 35 U.S.C. §103. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejection of Claims 11, 23 and 30 under 35 U.S.C. §103(a)

Claims 11, 23, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gu *et al.* in view of Bonn *et al.* (U.S. Patent No. 5,585,236), for the reasons stated in the Office Action of paper no. 4 (Office Action, page 12). The Examiner states that "the present claims encompass 'obtaining' in any manner any type of 'nucleic acid-containing sample'" and that "[a]ccordingly, methods in which 'obtaining' is achieved by steps including amplification using 'specific PCR primers' are encompassed by the present claims" (Office Action, page 13).

Applicants note that Claims 1, 14, 28, 46, 47 and 48 have been amended to recite "obtaining a **non-PCR amplified** nucleic acid-containing sample" (emphasis added). Again, as described above, Gu *et al.* does not anticipate or render obvious Claims 1-4, 8-10, 12-17, 21-22, 24-25, 27-29, 31-32 and 46-49, particularly as amended. Since Claims 11, 23 and 30 incorporate all of the limitations of the claims from which they depend, Gu *et al.* also does not anticipate or render obvious Claims 11, 23 and 30.

The addition of Bonn *et al.* does not remedy the defects of Gu *et al.* While Applicants do not concede that one of ordinary skill in the art would have been motivated to combine the teaching of Gu *et al.* and Bonn *et al.*, the combination would not provide a reasonable expectation of success in producing the claimed invention, as required under 35 U.S.C. §103. At most, the combination would result in isolating nucleic acid fragments using HPLC in the

methods of Gu *et al.* Therefore, neither Gu *et al.* nor Bonn *et al.*, either alone or in combination, teach or suggest a method for detecting a collection of polymorphisms comprising obtaining a **non-PCR amplified** nucleic acid-containing sample and isolating a subset of nucleic acid fragments using HPLC. Thus, Gu *et al.* and Bonn *et al.* do not teach or suggest all claim limitations of Applicants' invention, as required under 35 U.S.C. §103. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejection of Claims 33-35 under 35 U.S.C. §103(a)

Claims 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gu *et al.* in view of Drmanac (U.S. Patent No. 6,025,136), for the reasons stated in the Office Action of paper no. 4. The Examiner states that "the present claims encompass 'obtaining' in any manner any type of nucleic-acid containing sample" and that "[a]ccordingly, methods in which 'obtaining' is achieved by steps including amplification using 'specific PCR primers' are encompassed by the present claims" (Office Action, page 14).


Once again, Applicants note that Claims 1, 14, 28, 46, 47 and 48 have been amended to recite "obtaining a **non-PCR amplified** nucleic acid-containing sample". Gu *et al.* does not anticipate or render obvious Claims 1-4, 8-10, 12-17, 21-22, 24-25, 27-29, 31-32 and 46-49, particularly as amended. Since Claims 33-35 incorporate all of the limitations of the claims from which they depend, Gu *et al.* also does not anticipate or render obvious Claims 33-35.

The addition of Drmanac does not remedy the defects of Gu *et al.* Specifically, neither Gu *et al.* nor Drmanac teach or suggest a method for genotyping a nucleic acid sample comprising obtaining a non-PCR amplified nucleic acid-containing sample. While Applicants do not concede that one of ordinary skill in the art would have been motivated to combine the teaching of Gu *et al.* and Drmanac, the combination clearly does not teach or suggest all limitations of Applicants' invention, as required under 35 U.S.C. §103. Furthermore, the combination does not provide a reasonable expectation of success in producing the claimed invention. Reconsideration and withdrawal of the rejection are respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned at (978) 341-0036.

Respectfully submitted,
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By 

Brian P. Turano
Registration No. 50,734
Telephone: (978) 341-0036
Facsimile: (978) 341-0136

Concord, MA 01742-9133

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MARKED UP VERSION OF AMENDMENTSClaim Amendments Under 37 C.F.R. § 1.121(c)(1)(ii)

1. (Twice Amended) A method for [identifying] detecting a collection of polymorphisms from nucleic acid molecules in a sample, [by analyzing a subset of the molecules,] consisting essentially of the steps of:
 - a. obtaining a non-PCR amplified nucleic acid-containing sample;
 - b. treating the nucleic acid molecules in said sample to produce a reduced representation of nucleic acid fragments [selected] isolated in a sequence-dependent manner by a method comprising:
 - i. fractionating said nucleic acid molecules to produce nucleic acid fragments; and
 - ii. [selecting] isolating a subset of said nucleic acid fragments,wherein either (i) or (ii) or both (i) and (ii) are performed in a sequence-dependent manner;
 - c. [analyzing the reduced representation to identify] detecting pairs of fragments from the same chromosomal location in the reduced representation, wherein pairs of fragments from the same chromosomal location are orthologous sequences; and
 - d. comparing [pairs of] orthologous sequences to [identify] detect polymorphisms between said sequences,thereby [identifying] detecting a collection of polymorphisms.
12. (Amended) The method of Claim 1, wherein step (b)(ii) is performed by [selecting] isolating nucleic acid fragments which hybridize to [selected] isolated additional nucleic acid sequences.

- d. comparing [pairs of] orthologous sequences to [identify] detect polymorphisms between the orthologous sequences;
 - e. obtaining a second nucleic acid-containing sample from an individual to be assessed; and
 - f. [analyzing said second nucleic acid-containing sample to assess the genotype at one or more polymorphisms identified in (d), thereby genotyping a nucleic acid-containing sample from an individual to determine] determining the nucleotide present at one or more polymorphic sites identified in (d), thereby genotyping a nucleic acid-containing sample from an individual.
49. (Twice Amended) A method according to Claim 48, wherein the second nucleic acid-containing sample is a sample which has been treated by a method comprising:
- i. fractionating the nucleic acid molecules in said sample to produce nucleic acid fragments; and
 - ii. [selecting] isolating a subset of said nucleic acid fragments;
- wherein either (i) or (ii) or both (i) and (ii) are done in a sequence-dependent manner.